

1/10/18

"Ask not what your country can do for you, ask what you can do for your country."-John F. Kennedy

HW: "Long Division of Polynomials" #5, 7  
Take home test given Friday 1/12

AIM: How do we do Polynomial Long Division?

Warm Up:

Divide 546 by 4 using long division.

$$\begin{array}{r}
 136 + \frac{2}{4} \\
 4 \overline{) 546} \\
 \underline{-4} \phantom{0} \phantom{0} \phantom{0} \\
 14 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{-12} \phantom{0} \phantom{0} \phantom{0} \\
 26 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{-24} \phantom{0} \phantom{0} \phantom{0} \\
 2
 \end{array}$$

$$\begin{array}{c}
 \text{Quotient} + \overset{\text{rem.}}{\text{divisor}} \\
 \hline
 \text{Divisor} \overline{) \text{Dividend}}
 \end{array}$$

$$\frac{\text{Dividend}}{\text{Divisor}} = \text{Quotient} + \frac{\text{Remainder}}{\text{Divisor}}$$

HW ✓

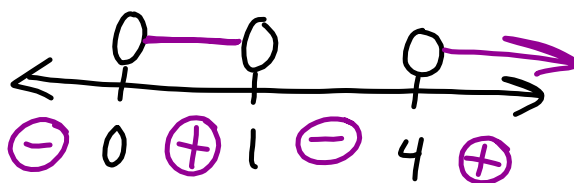
$$7) \frac{x^2 - 5x + 4}{x} > 0$$

$$\frac{(x-4)(x-1)}{x} > 0 \quad \text{Pos.}$$

$$\begin{aligned} x-4 &= 0 & x-1 &= 0 & x &= 0 \\ x &= 4 & x &= 1 & & \\ \text{open} & & \text{open} & & \text{open} & \end{aligned}$$

$$\begin{aligned} x-1 &= 0 & x &= 0 \\ x &= 1 & & \\ \text{open} & & \text{open} & \end{aligned}$$

$$\begin{aligned} x &= 0 \\ \text{open} \end{aligned}$$



$$\underline{\text{SB:}} \{x \mid 0 < x < 1 \vee 4 < x\}$$

$$\underline{\text{Int:}} (0, 1) \cup (4, \infty)$$

Divide using long division.

1.  $(m^2 - 7m - 11) \div (m - 8)$

$$\begin{array}{r}
 m + 1 + \frac{-3}{m-8} \\
 m-8 \overline{) m^2 - 7m - 11} \\
 \underline{m^2 - 8m} \phantom{- 11} \\
 m - 11 \\
 \underline{-(m - 8)} \\
 -3
 \end{array}$$

$m(m-8) \rightarrow (m^2 - 8m)$

$$m + 1 + \frac{-3}{m-8}$$

$$\frac{m^2}{m} = m$$

$$\frac{1m}{m} = 1$$

3.  $(n^2 + 10n + 18) \div (n + 5)$

$$\begin{array}{r} n + 5 + \frac{-7}{n+5} \\ n+5 \overline{) n^2 + 10n + 18} \\ \underline{-(n^2 + 5n)} \phantom{+ 18} \downarrow \\ 5n + 18 \\ \underline{-(5n + 25)} \\ \textcircled{-7} \end{array}$$

$$5 \overline{)104}$$

$$1234$$

$$13$$

$$1003$$

6.  $(a^2 - 28) \div (a - 5)$  no a term

$$\begin{array}{r} a-5 \overline{) a^2 + 0a - 28} \\ \underline{-(a^2 - 5a)} \phantom{-28} \downarrow \\ 5a - 28 \\ \underline{-(5a - 25)} \\ -3 \end{array}$$

$a + 5 + \frac{-3}{a-5}$

$$\frac{a^2}{a} = a$$

9.  $(2x^2 - 17x - 38) \div (2x + 3)$

$$\begin{array}{r}
 \textcolor{blue}{2x+3} \overline{\textcolor{blue}{2x^2-17x-38}} \\
 \textcolor{green}{\ominus(2x^2+3x)} \quad \downarrow \\
 \textcolor{green}{-20x-38} \\
 \textcolor{red}{\ominus(-20x-30)} \\
 \hline
 \textcolor{red}{(-8)}
 \end{array}$$

$$\frac{2x^2}{2x} = x$$

16.  $(40x - 13x^2 + x^3 + 18) \div (x - 7)$

$$\begin{array}{r} \textcircled{x^2 - 6x - 2 + \frac{4}{x-7}} \\ x-7 \overline{) x^3 - 13x^2 + 40x + 18} \\ \underline{-(x^3 - 7x^2)} \phantom{+ 18} \downarrow \\ -6x^2 + 40x \phantom{+ 18} \downarrow \\ \underline{-(-6x^2 + 42x)} \phantom{+ 18} \downarrow \\ -2x + 18 \phantom{+ 18} \downarrow \\ \underline{-(-2x + 14)} \\ \textcircled{4} \end{array}$$



HW check:

$$\begin{array}{r}
 5) \quad \underline{n-7} \overline{) n^2 - 3n - 21} \\
 \underline{-(n^2 - 7n)} \phantom{-21} \\
 4n - 21 \\
 \underline{-(4n - 28)} \\
 7
 \end{array}$$

$$n + 4 + \frac{7}{n-7}$$

$$\begin{array}{r}
 7) \quad \underline{r+8} \overline{) r^2 + 14r + 38} \\
 \underline{-(r^2 + 8r)} \phantom{+38} \\
 6r + 38 \\
 \underline{-(6r + 48)} \\
 -10
 \end{array}
 \quad \text{OR} \quad r + 6 + \frac{-10}{r+8}$$

$$103) \quad (x^5 - 3x^2 + x) \div (x^2 - 2)$$

$$\frac{2x^3}{x^2} = 2x$$

$$\begin{array}{r}
 \overset{3}{x} + 2x - 3 + \frac{5x-6}{x^2-2} \\
 \hline
 \overset{2}{x} + 0x - 2 \overline{) x^5 + 0x^4 + 0x^3 - 3x^2 + x + 0} \\
 \underline{\ominus (x^5 + 0x^4 - 2x^3)} \quad \downarrow \quad \downarrow \quad \downarrow \\
 \quad \quad \quad 2x^3 - 3x^2 + x \quad \quad \quad \downarrow \\
 \quad \quad \quad \underline{\ominus (2x^3 + 0x^2 - 4x)} \quad \quad \quad \downarrow \\
 \quad \quad \quad \quad \quad \quad -3x^2 + 5x + 0 \\
 \quad \quad \quad \quad \quad \quad \underline{\ominus (-3x^2 + 0x + 6)} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad 5x - 6
 \end{array}$$

$\frac{3}{x} + 2x - 3 + \frac{5x-6}{x^2-2}$

$$15 \overline{)14}$$

$$105 \overline{)1040}$$

$$\begin{array}{r} \phantom{3}x^3 + 2x^2 \\ x^2 - 2 \overline{) x^5 - 3x^2 + x} \\ \underline{-(x^5 - 2x^3)} \phantom{+ x} \downarrow \\ \phantom{x^5 - } -3x^2 + 2x^3 + x \\ \phantom{x^5 - } 2x^3 - 3x^2 + x \end{array}$$

$$20) (10k^2 - 35k + 50k^3 - 7) \div (-4 + 5k)$$

$$\boxed{10k^2 + 10k + 1 + \frac{-3}{5k-4}}$$

$$\begin{array}{r}
5k-4 \overline{) 50k^3 + 10k^2 - 35k - 7} \\
\underline{-(50k^3 - 40k^2)} \phantom{- 7} \\
50k^2 - 35k \phantom{- 7} \\
\underline{-(50k^2 - 40k)} \phantom{- 7} \\
5k - 7 \\
\underline{-(5k - 4)} \\
-3
\end{array}$$